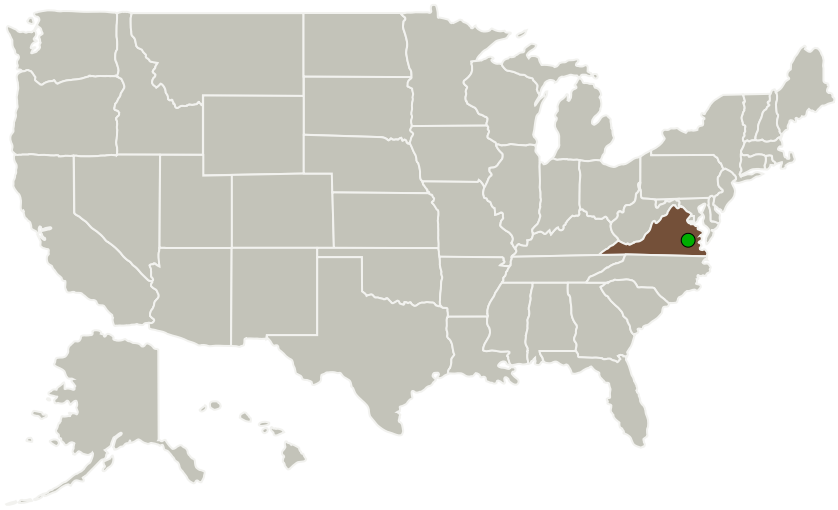
Emile: The EventML Explorer, Phase II

Completed Technology Project (2012 - 2014)

Project Introduction

The protocols needed to coordinate the activities of distributed components, such as consensus algorithms, are notoriously difficult to design, implement, and verify. Abstraction is the only way to gain intellectual control over this complex problem; so ATC-NY and Cornell University have developed Event Logic, a high-level model for describing and reasoning about distributed systems, and EventML, a high-level functional language for implementing distributed protocols by "programming with events." Properties of EventML protocols can be formally verified by interactive theorem proving in the Nuprl environment. To integrate these conceptual tools with standard processes of system development, and to make the labor intensive task of verifying protocol properties more efficient, ATC-NY is developing Emile. Emile is a software tool that provides: a semantic interface to EventML that translates assertions about properties of EventML programs into logical forms to which powerful fully automated analysis tools can be applied, along with a "logical manager" that can direct analyses involving the interaction of these tools. We will demonstrate Emile by using it to verify the key properties of EventML source code for standard consensus algorithms, such as Paxos.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Odyssey Research Associates, Inc.	Lead Organization	Industry	Ithaca, New York
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations
Virginia

Project Transitions

December 2012: Project Start

December 2014: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/137312)*

Images

Project Image
Emile: The EventML Explorer
(https://techport.nasa.gov/image/128758)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Odyssey Research Associates, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

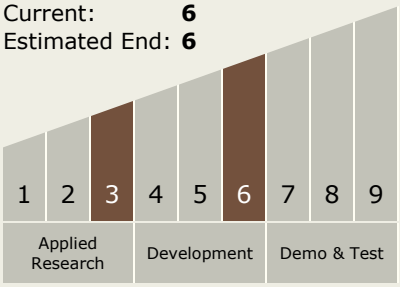
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
David Guaspari

Technology Maturity (TRL)

Start: **3**
Current: **6**
Estimated End: **6**



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Technology Areas

Primary:

- TX11 Software, Modeling, Simulation, and Information Processing
  - TX11.2 Modeling
    - TX11.2.2 Integrated Hardware and Software Modeling

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System